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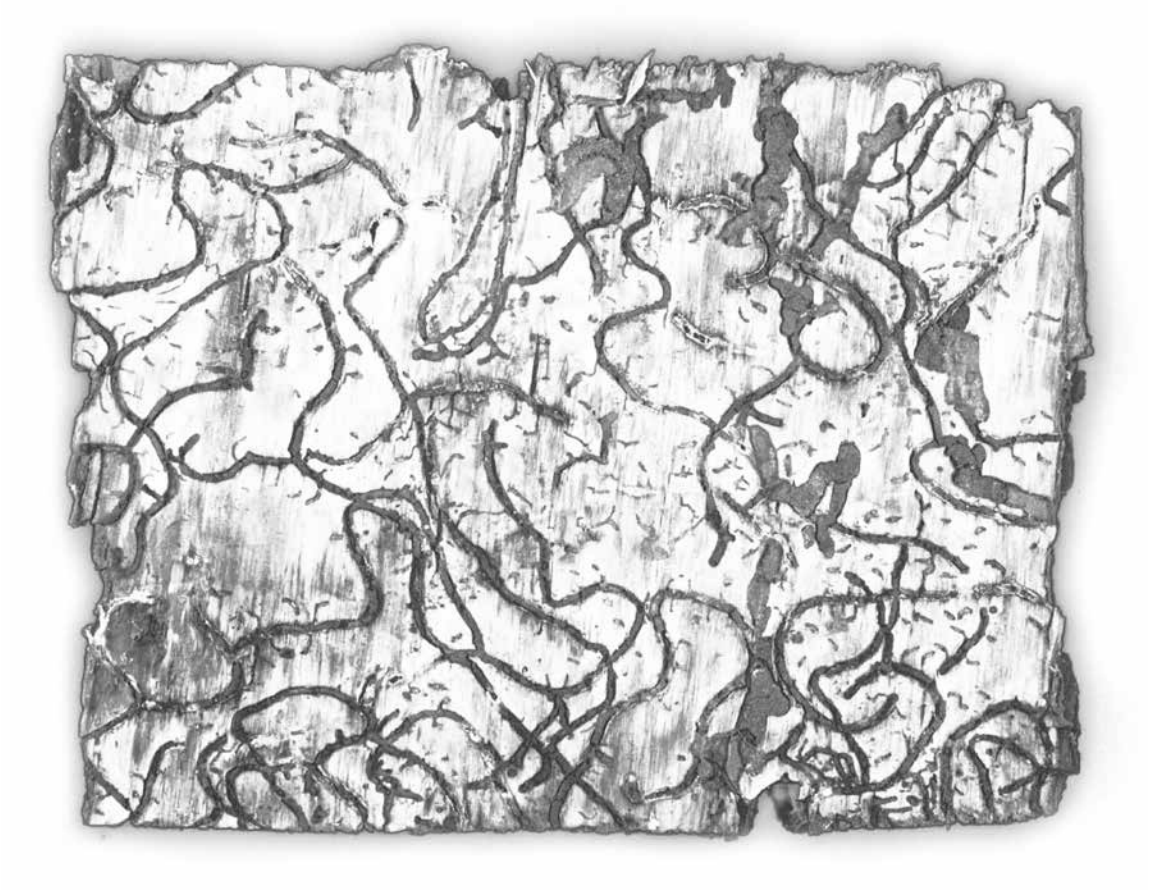
Bark Beetles of Northeastern Pines

An Illustrated Guide to Common Species



Forest Service

Eastern Region
State and Private Forestry

R9-PR-001-20

August 2020

Acknowledgments:

We would like to thank Robert Rabaglia (USDA Forest Service, State & Private Forestry, Forest Health Protection, Washington Office) for reviewing and providing valuable comments on a draft of this document.

Cover photo: The underside of bark peeled from a pine tree killed by the southern pine beetle (*Dendroctonus frontalis*), showing the typical serpentine feeding galleries. (Courtesy photo by W.H. Bennett, USDA Forest Service, Bugwood.org)

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An Illustrated Guide to Common Species

Marc F. DiGirolomo and Kevin J. Dodds

Published by:

Forest Service
Eastern Region
State and Private Forestry
626 East Wisconsin Avenue
Milwaukee, WI 53202
https://www.fs.usda.gov/r9

R9-PR-001-20
August 2020

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Distribution of Native Pines in New England and New York

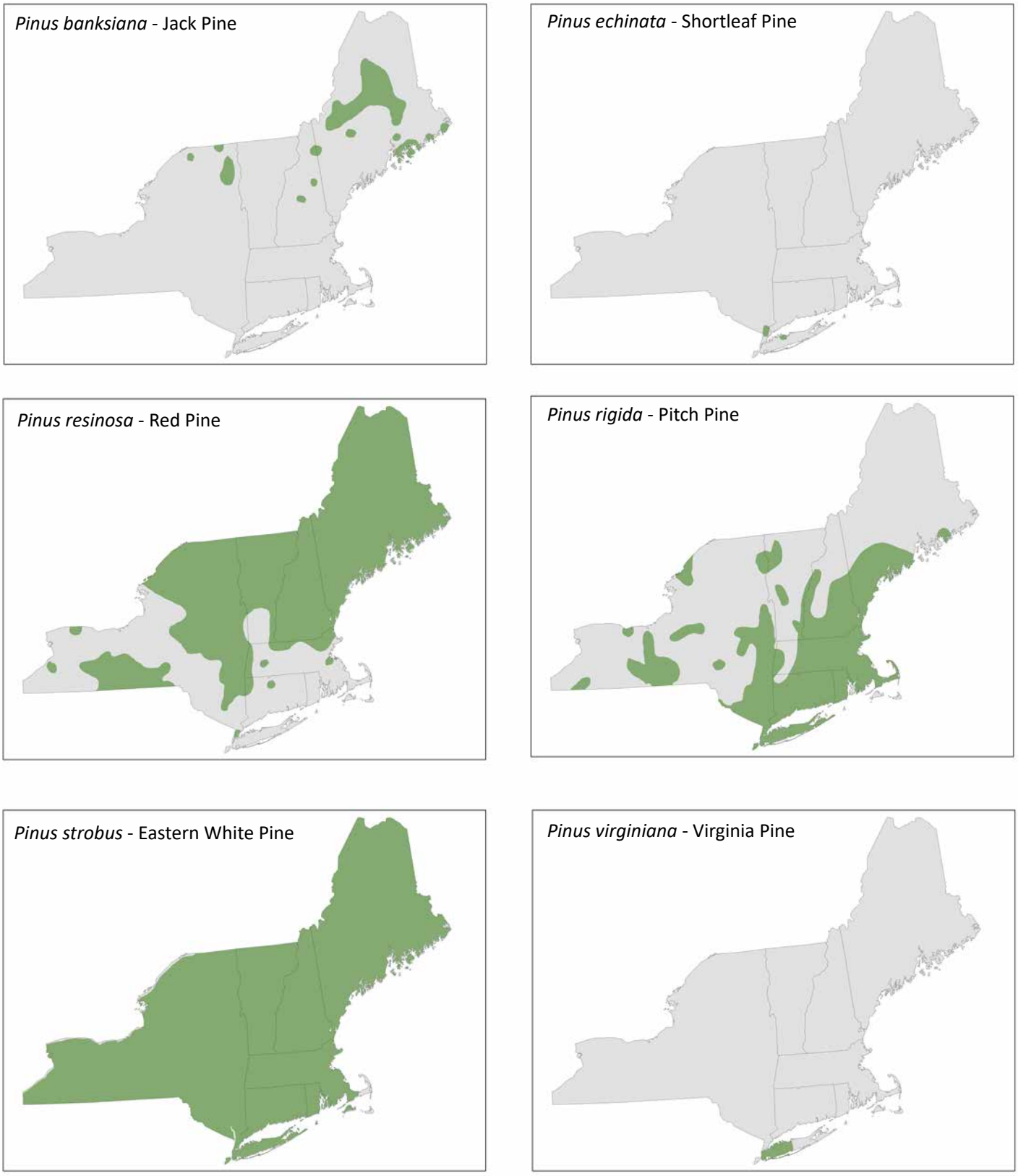

Pinus banksiana - Jack Pine
Pinus echinata - Shortleaf Pine
Pinus resinosa - Red Pine
Pinus rigida - Pitch Pine
Pinus strobus - Eastern White Pine
Pinus virginiana - Virginia Pine

Figure 1.—Distribution of native pines in New England and New York. (Source: Prasad, A.M.; Iverson, L.R. 2003. Little's range and FIA importance value database for 135 eastern US tree species. RWU NE–4153. Delaware, OH: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. http://www.fs.fed.us/ne/delaware/4153/global/littlefia/index.html. (28 January 2020).

Introduction

Bark beetles (Coleoptera: Curculionidae: Scolytinae) are one of the most economically significant forest pests. Many species, both foreign and native, cause considerable damage each year to native pines in New England and New York (figure 1—facing page).

Southern pine beetle (SPB), *Dendroctonus frontalis*, is present in the Northeastern United States and predicted to spread throughout the region in the coming decades. It is relatively easy to identify this aggressive killer of pines in attacked trees by its unique larval gallery pattern (Cover photo) or resin buildup on the outer bark at attack sites above breast height on the tree bole (figure 2). However, a suite of other bark beetles that live in the phloem can also colonize either freshly killed trees, such as those attacked by SPB, or stressed and dying trees. The presence of these other bark beetles may cause some confusion during forest health surveys and lead to misdiagnosis of what killed a tree.

Detection and monitoring trapping (figure 3) have also expanded because SPB is now in the Northeast. Although these traps are baited with a combination of beetle pheromones and tree host volatiles that target SPB, these traps also attract other bark beetle species, including many of the species found during tree inspections. Forest health professionals and natural resource managers will encounter bark beetle species other than SPB during either visual surveys of trees or trapping efforts. Because of this, bark beetle identification tools would be useful for forest health surveyors. This guide provides a key to common phloem-inhabiting bark beetles of pine, biological information on select species, and detailed photographs of common species found in the Northeastern U.S.

Limitations of this Guide

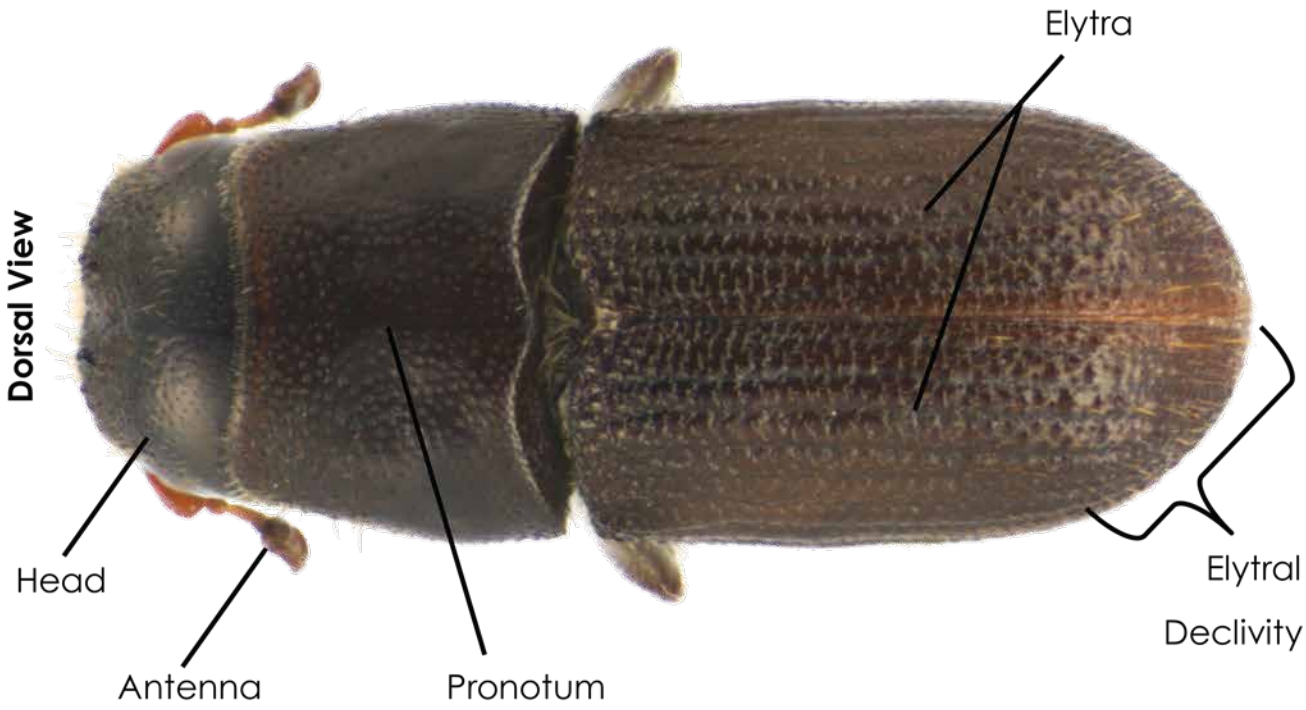
This guide is one tool in the toolbox of resources for identifying bark beetles. The species detailed here are the Scolytinae most likely to be seen inhabiting stressed and recently killed pine trees in the Northeastern United States. It is also likely that several other species may be encountered during tree or trapping surveys, especially those infesting branches, twigs, and cones. Surveyors may see phloem-inhabiting beetles in the *Crypturgus*, *Dryocoetes*, *Hylurgus*, *Hypothenemus*, *Pityogenes*, *Pityophthorus*, *Polygraphus*, and *Tomicus* genera. Sapwood-inhabiting species, including those in the *Euwallacea*, *Gnathotrichus*, *Trypodendron*, *Xyleborinus*, *Xyleborus*, and *Xylosandrus* genera, are also likely to be encountered at times. Representative images of these genera can be found on page 34. We recommend consulting the resources listed on page 36 for more information on the diversity, distribution, and biology of bark and ambrosia beetles in the Northeast.

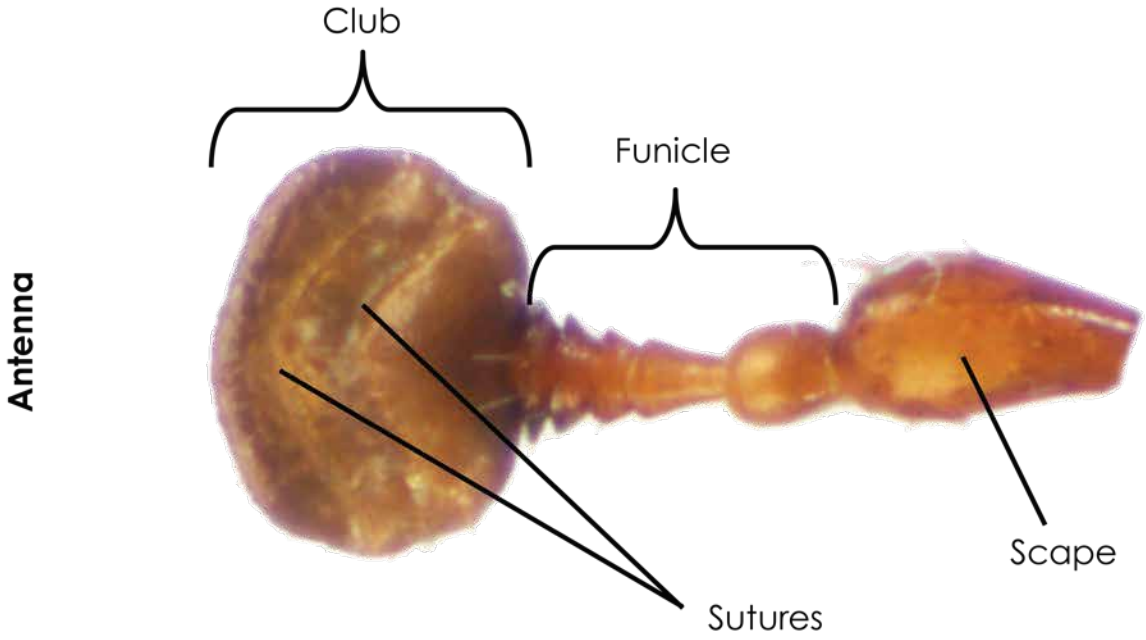
Figure 2.—*Dendroctonus frontalis*-infested pine with resin buildup at attack sites.

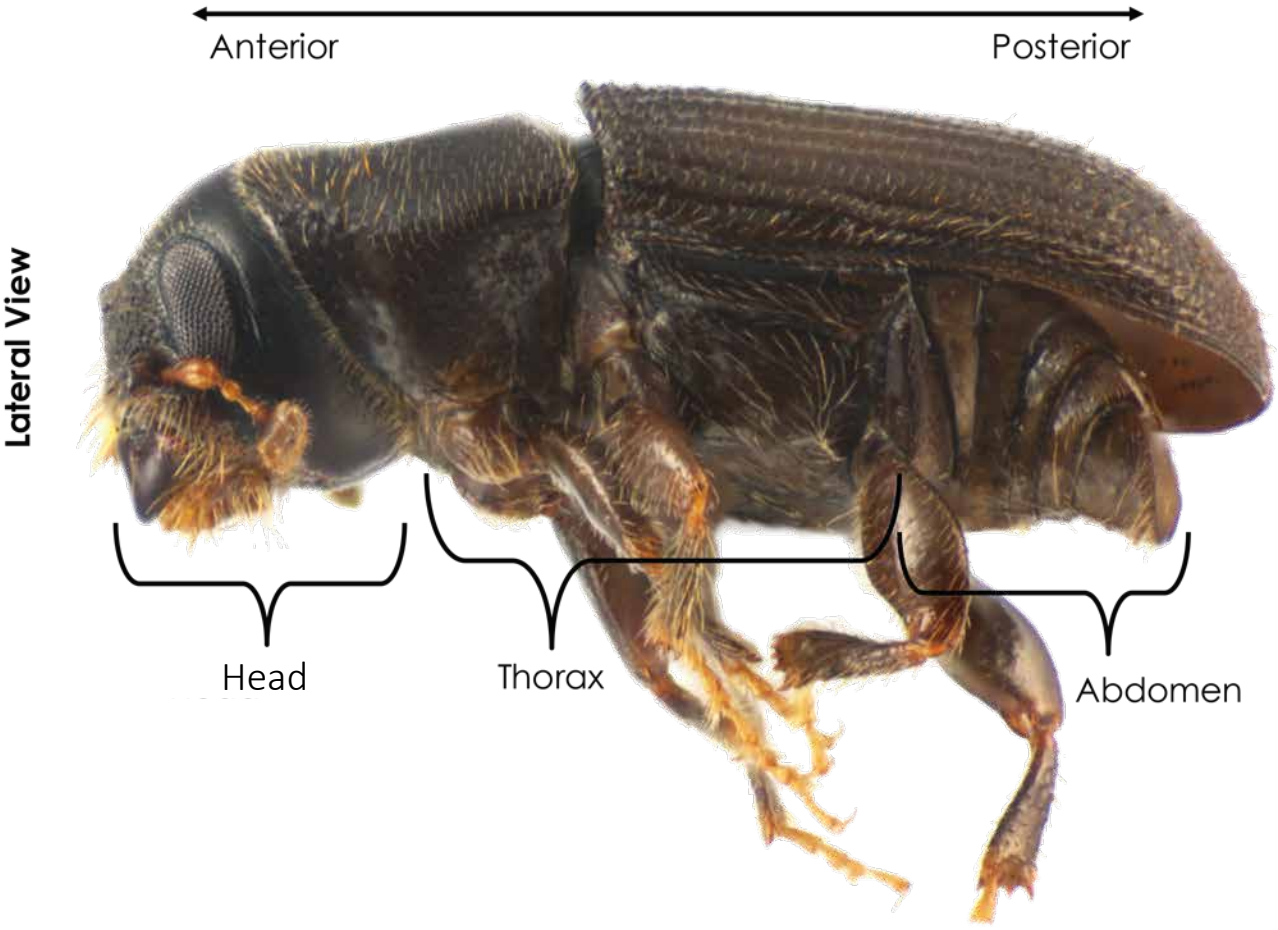
Figure 3.—Multiple-funnel trap deployed in a recently harvested pitch pine stand in the Montague Plains Wildlife Management Area in Massachusetts.

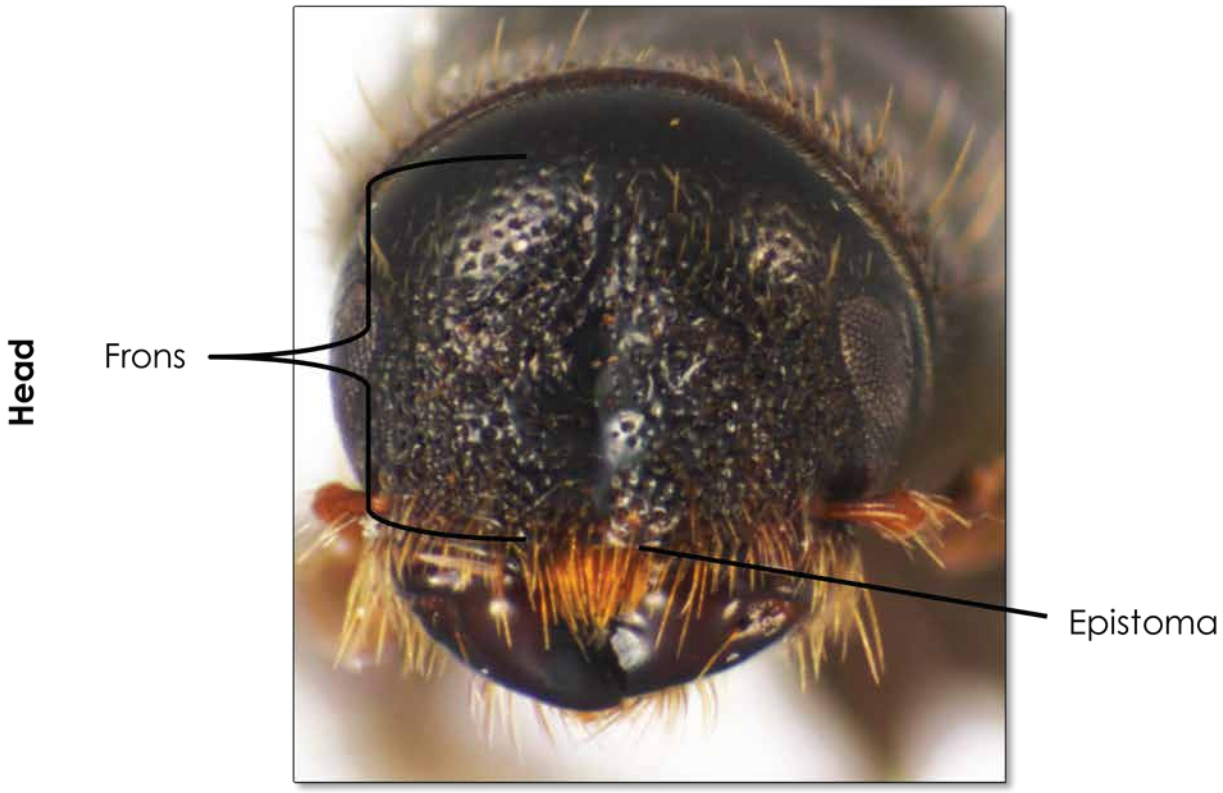
Basic Anatomy of a Bark Beetle

See page 35 for a glossary of technical terms.



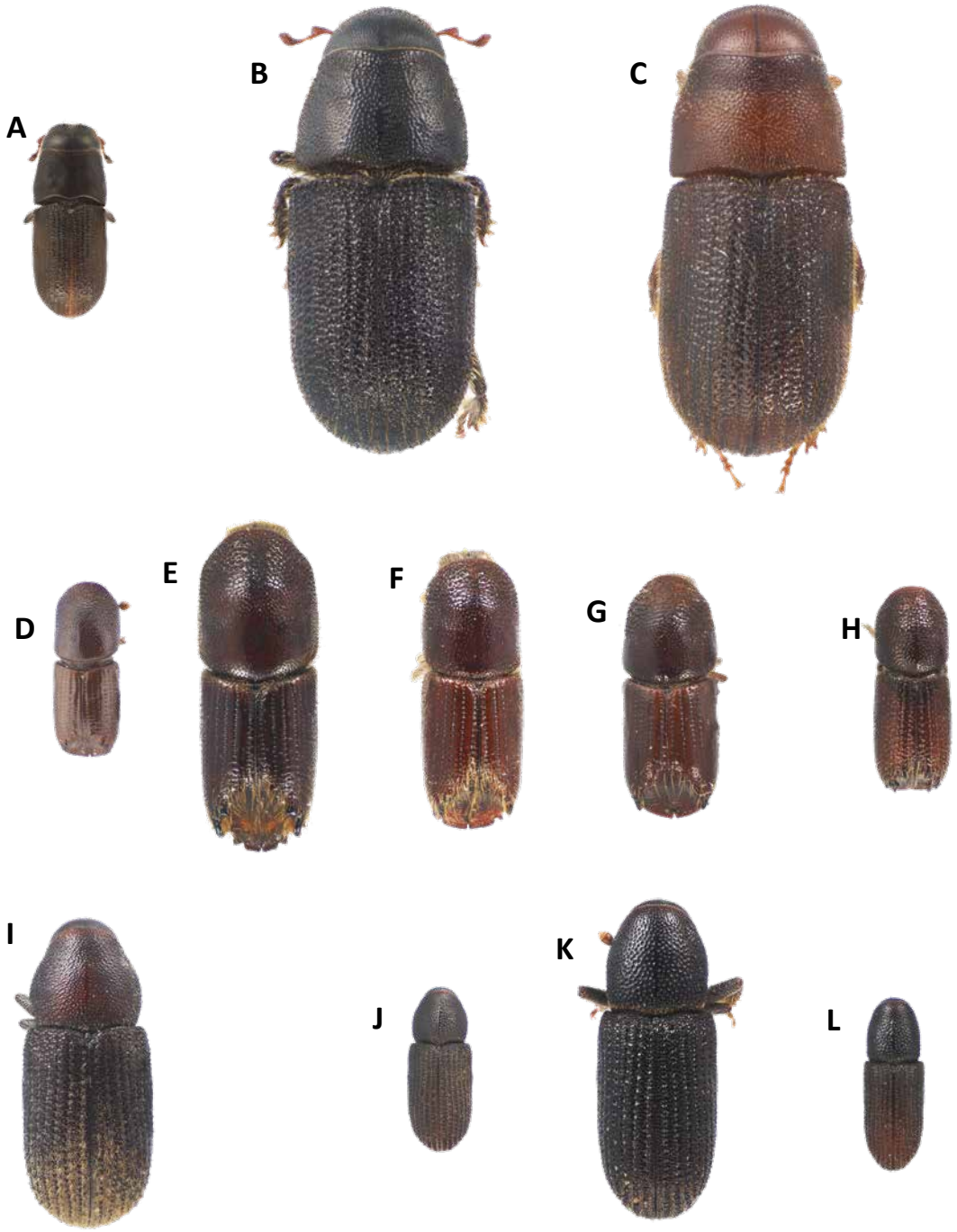



Lateral View
Anterior
Posterior
Head
Thorax
Abdomen


Head
Frons
Epistoma

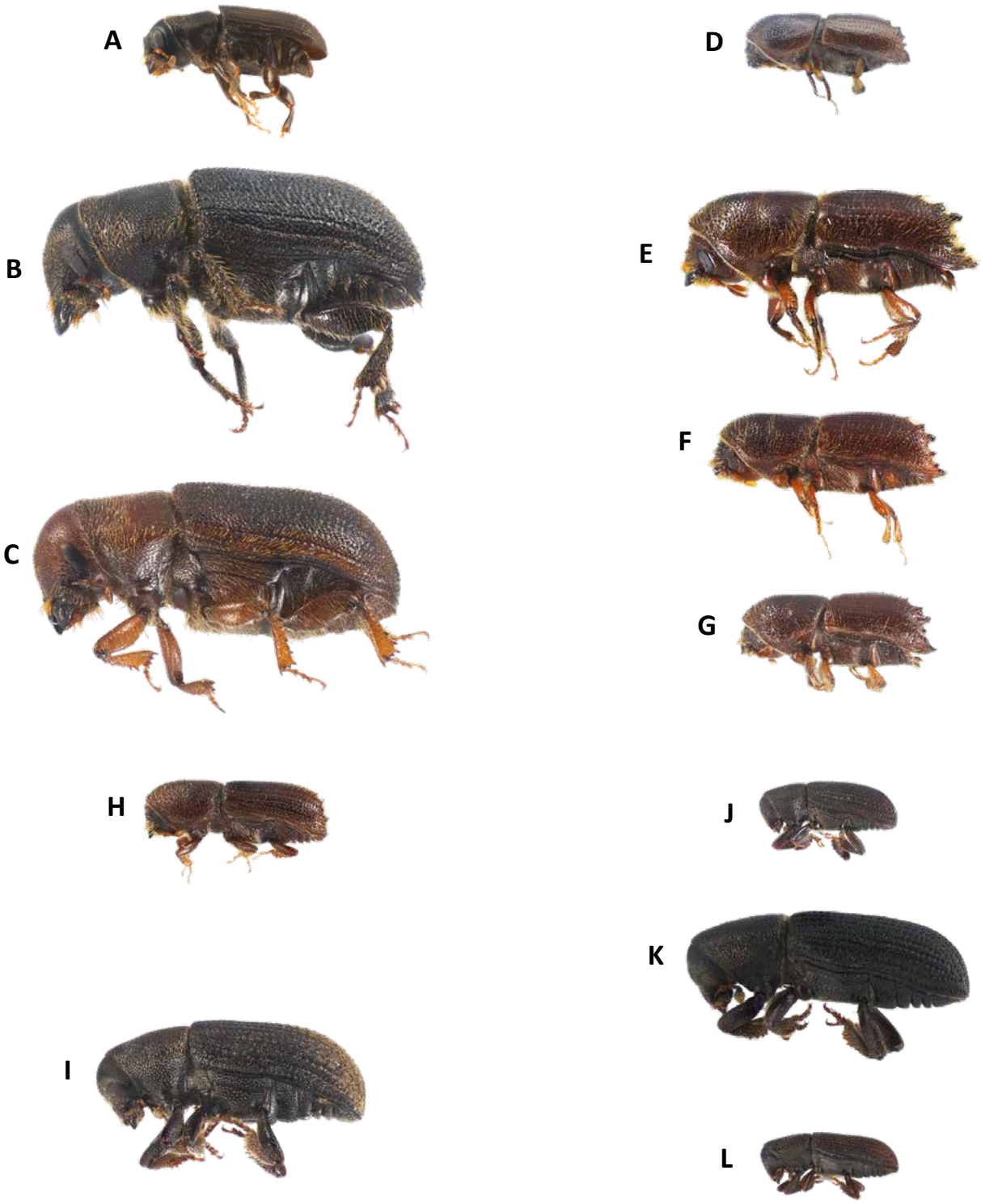
Quick Habitus Reference

Dorsal View



Dorsal habitus of species treated in this guide. All are at the same scale. (A) *Dendroctonus frontalis*, (B) *D. terebrans*, (C) *D. valens*, (D) *Ips avulsus*, (E) *I. calligraphus*, (F) *I. grandicollis*, (G) *I. pini*, (H) *Orthotomicus caelatus*, (I) *Hylurgops pinifex*, (J) *Hylastes opacus*, (K) *Hylastes porculus*, (L) *Hylastes tenuis*.

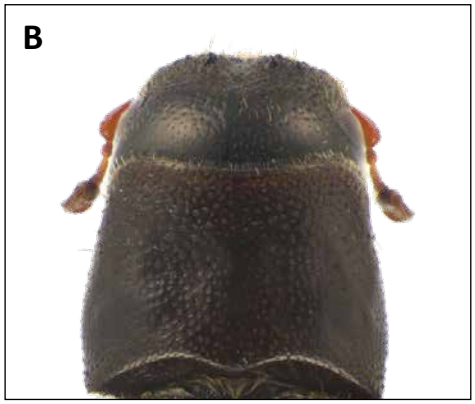
Lateral View

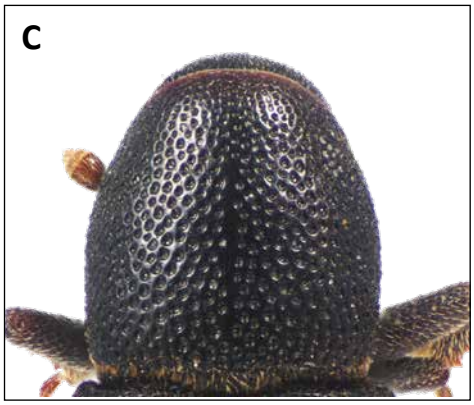


Lateral habitus of species treated in this guide. All are at the same scale. (A) *Dendroctonus frontalis*, (B) *D. terebrans*, (C) *D. valens*, (D) *Ips avulsus*, (E) *I. calligraphus*, (F) *I. grandicollis*, (G) *I. pini*, (H) *Orthotomicus caelatus*, (I) *Hylurgops pinifex*, (J) *Hylastes opacus*, (K) *Hylastes porculus*, (L) *Hylastes tenuis*.

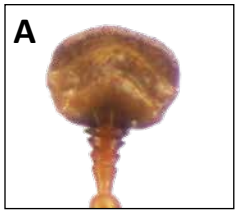
Key to Species in this Guide

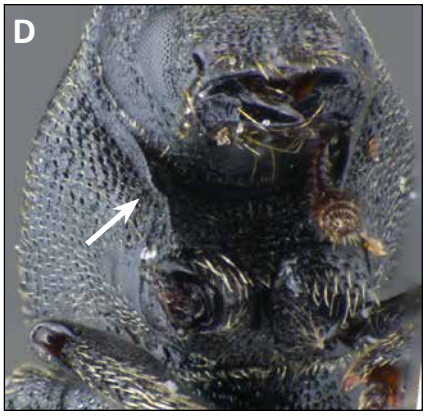
1. Head obviously visible from above (A, B) **2**
1'. Head not or only slightly visible from above (C, D) **5**





2(1). Antennal club flattened (A); lateral prosternal area without sharply elevated ridge (B) **3**
2'. Antennal club conical (C); lateral prosternal area with sharply elevated ridge from coxa to anterior margin (D)..... **5**



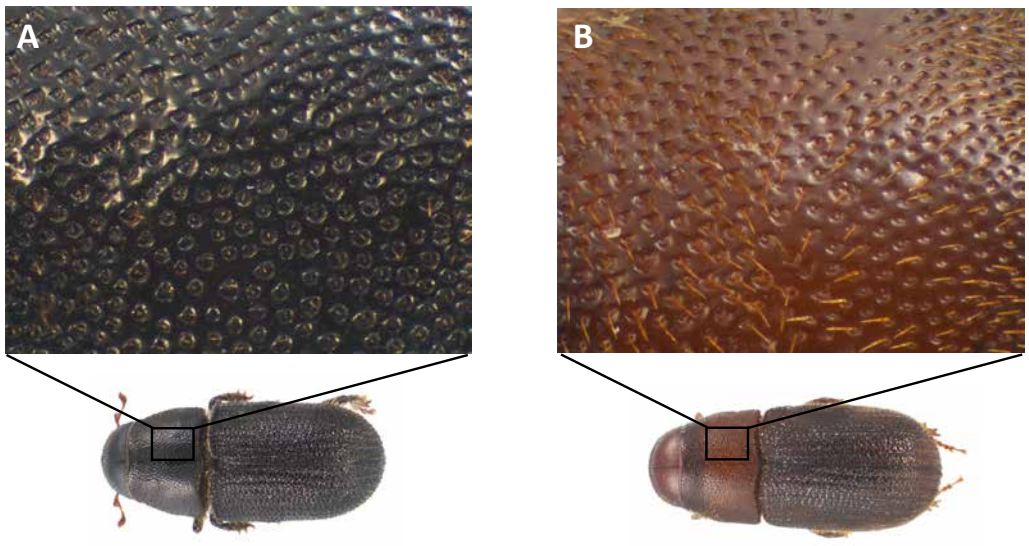


3(2). Frons with a deep frontal groove and two large (▯) or small (▯) lateral tubercles (A, B); size small (2.0–3.2 mm) ..... ***Dendroctonus frontalis***

3'. Frons without groove or tubercles (C); size large (5.0–9.0 mm) **4**

4(3). Mature color black, pronotal punctures more coarse (A) ..... ***Dendroctonus terebrans***

4'. Mature color red, pronotal punctures less coarse (B) ..... ***Dendroctonus valens***

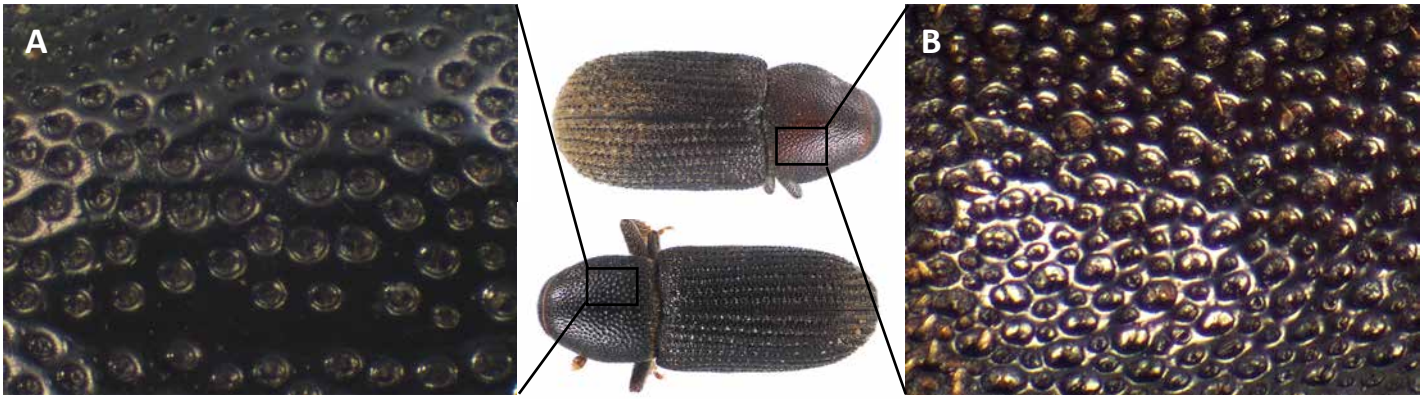


5(1 or 2). Antennal club conical (A) **6**

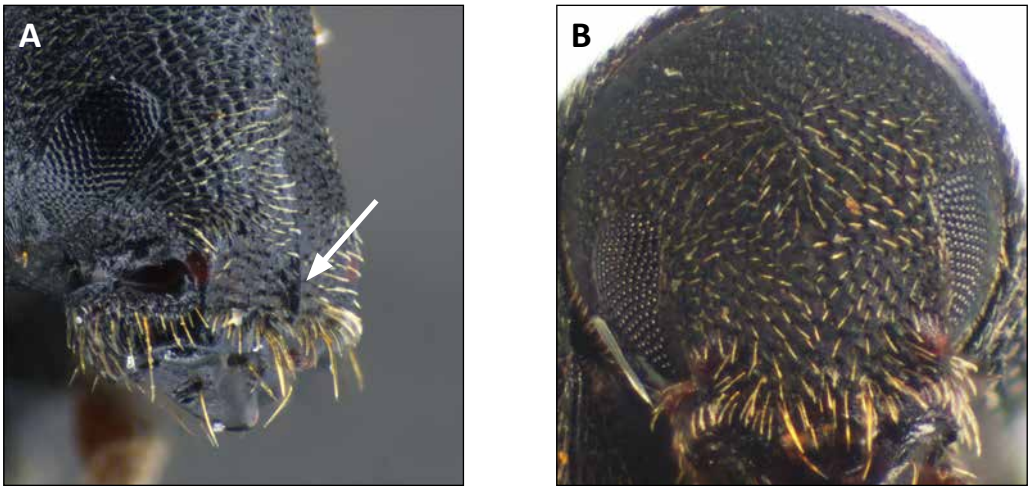
5'. Antennal club flattened (B) or obliquely truncate (C) **9**

Key to Species in this Guide (continued)

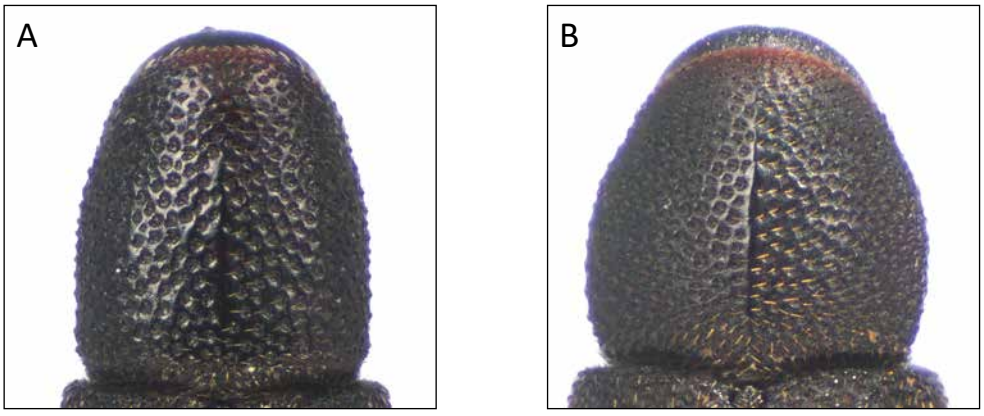
6(5). Pronotal punctures more or less uniformly large (A)..... **7**
6'. Pronotal punctures consisting of intermixed large and small sizes (B)..... ***Hylurgops pinifex***



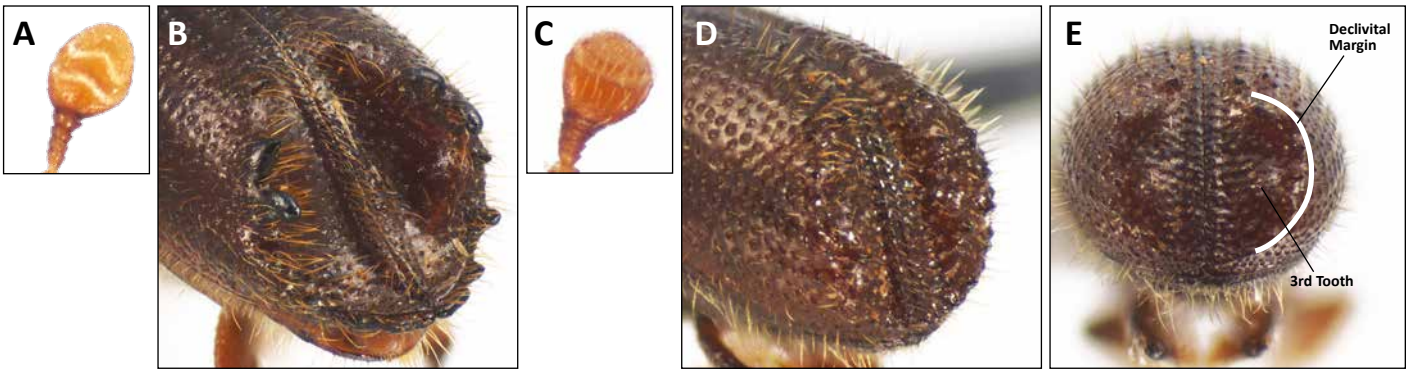
7(6). Lower frons with a sharply elevated median carina (A); size large (3.8–5.0 mm) ..... ***Hylastes porculus***
7'. Frons lacking a carina (B); size small (2.0–3.0 mm) ***8***



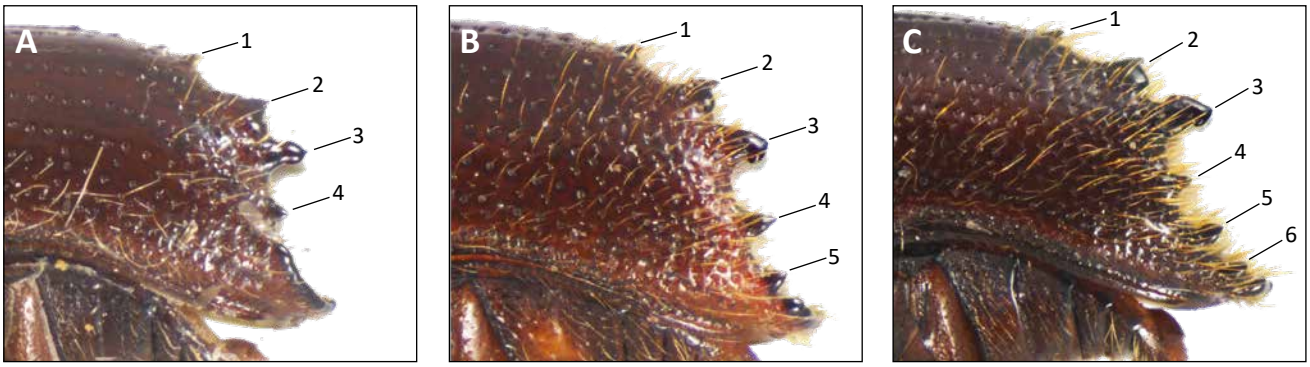
8(7). Pronotum (in dorsal view) with sides evenly rounded to nearly parallel, especially in basal third (A); body more slender..... ***Hylastes tenuis***
8'. Pronotum (in dorsal view) more rounded and with an obvious constriction toward anterior end (B); body more robust ..... ***Hylastes opacus***



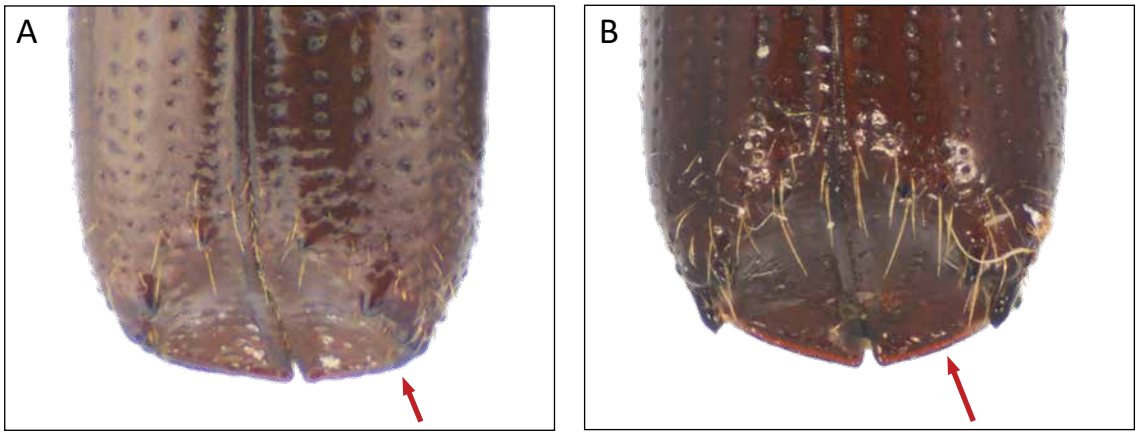
9(5). Antennal club flattened (A), sutures procurved or bisinuate; elytral declivity broadly excavated (B), armed by 4 to 6 major spines, all of which are placed along summit of lateral margin **10**
9'. Antennal club obliquely truncate (C), sutures recurved; elytral declivity steeper, less strongly excavated (D), the third tooth displaced mesally, not on summit of declivital margin (E) ..... ***Orthotomicus caelatus***



10(9). Lateral margin of declivity armed by 4 pairs of spines (A) **11**
10'. Lateral margin of declivity armed by 5 pairs of spines (B) ..... ***Ips grandicollis***
10''. Lateral margin of declivity armed by 6 pairs of spines (C) ..... ***Ips calligraphus***



11(10). Margin along apex of elytra short (A); declivital spines smaller; size smaller (2.1–2.8 mm) ..... ***Ips avulsus***
11'. Margin along apex of elytra longer, more projecting and shelf-like (B); declivital spines larger; size larger (3.3–4.3 mm) ..... ***Ips pini***



Dendroctonus frontalis Zimmermann

Southern Pine Beetle

Biology

Dendroctonus frontalis can attack and kill healthy trees, which is unusual for bark beetles in the Northeast. Females locate a potential host and begin to build galleries. They emit aggregation pheromones that, combined with tree volatiles from fresh attacks attract males and additional females to the host tree. If this mass attack is successful, the beetles will overcome the tree's resin defenses, mate, and begin laying eggs in brood galleries. Females may then reemerge from the tree and proceed to attack a new host tree. As larvae feed and develop, expanding the gallery network, they gradually work toward the outer bark where they form a pupal cell. The pupae change into callow adults, which remain within the bark up to 2 weeks while their integument hardens and darkens. New brood adults then bore an exit hole directly out of the tree and typically disperse to attack another tree. It is not known how many generations may occur during a season in the Northeast.

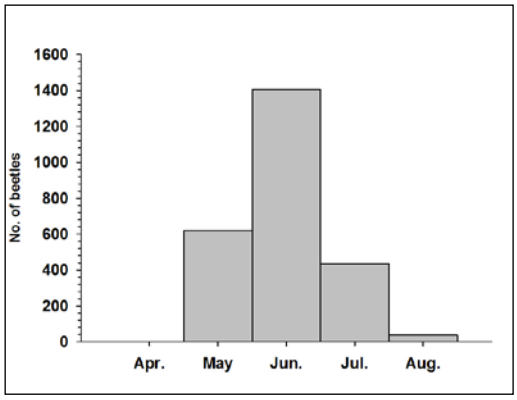
Winding, S-shaped parental galleries of *Dendroctonus frontalis*.

Northeastern Hosts

Common/likely: *Pinus banksiana* (jack pine), *Pinus echinata* (shortleaf pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus virginiana* (Virginia pine); Uncommon/reported: *Picea abies* (Norway spruce), *Picea rubens* (red spruce), *Tsuga canadensis* (eastern hemlock)

Gallery

Attacking beetles create elongate, winding, S-shaped tunnels (galleries) almost entirely in the phloem, scoring and staining the xylem but not engraving it. Galleries often branch, connect, or cross one another and are packed with frass. The diameter of the gallery is slighter greater than the width of the parent, and averages around 30 cm in length. Eggs are alternately deposited in small niches laterally along the length of the gallery. First instar larvae mine a thin, uniform tunnel about 1 cm approximately perpendicular to the egg gallery. It then widens abruptly, forming a short, irregular oval, within which feeding continues and the remaining instars are passed. This chamber is within the phloem and generally visible on bark peeled from an infested tree. On trees with thick phloem, it may be harder to observe without peeling into this tissue.



Dendroctonus frontalis, Flight Phenology, Long Island, New York, 2014.

Identification

This species can readily be separated from other northeastern-pine inhabiting members of the genus by its much smaller size and by the deep frontal groove on the frons of both sexes and large protuberances on the frons of males. The *D. frontalis* gallery pattern is unique to northeastern bark beetles and can be used to diagnose its presence within a tree. Its habit of attacking healthy trees is also unique in the Northeast.

Length 2.0–3.2 mm (average about 2.8 mm); head generally visible from above; antennal club strongly flattened with three procurved sutures; mature color light brown to dark brown to nearly black; deep median groove on frons between eyes with males bearing prominent elevated protuberances on either side of the groove; declivity is steeply sloped and rounded; hair-like vestiture is relatively abundant and rather long.

Dendroctonus frontalis male frons and tubercles (left pair) and *Dendroctonus frontalis* female frons and tubercles (right pair).

Dendroctonus terebrans (Olivier)

Biology

Two species of turpentine beetles occur in portions of the Northeastern U.S.: *Dendroctonus terebrans* (black turpentine beetle), generally found in the Southeastern U.S., and *Dendroctonus valens* (red turpentine beetle), a species with a larger distribution that includes northern portions of the Northeastern U.S. The distribution of these species does occasionally overlap in coastal areas from New Jersey to Massachusetts, but no hybridization has been reported.

Generally, *D. terebrans* is found colonizing the lower boles (usually below 6 ft) and roots of stressed or recently dead trees as well as freshly cut stumps. Females and males enter the host and begin excavating the gallery where eggs will be laid. Large globs of reddish resin are often found surrounding the site of an attack. Galleries are made in the phloem and are straight with eggs laid on one side. Larvae feed gregariously in groups and move away from the brood gallery. Pupation occurs in the phloem and/or bark.

Relative size of five northeastern *Dendroctonus* species. Top to bottom: *D. terebrans*, *D. valens*, *D. rufipennis**, *D. simplex**, *D. frontalis*. (*not treated in this guide)

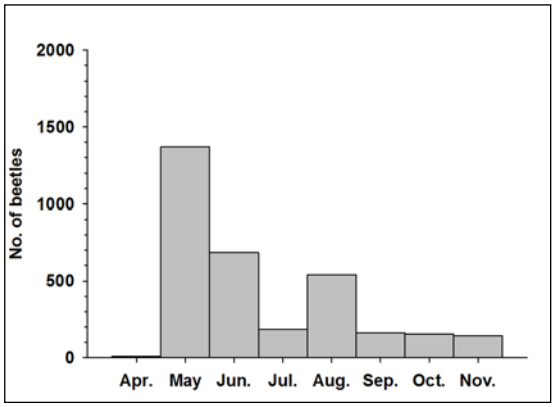
Northeastern Hosts

Pinus echinata (shortleaf pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Picea rubens* (red spruce)

Gallery

There can be substantial variation in *D. terebrans* egg galleries. The most commonly encountered gallery is one that is longitudinal, with eggs laid along the edge of one side. The gallery is formed below the attack site and can extend up to 12 in or more.

Egg galleries and gregarious larval feeding area of *D. terebrans*.



Dendroctonus terebrans, Flight Phenology, Long Island, New York, 2017.

Identification

This species is very closely related to *D. valens*, but they do not overlap over most of their distributions. Where they do coexist, the adults can be separated by body color (*D. terebrans* = blackish, *D. valens* = reddish); by the larger punctures on the pronotum of *D. terebrans* (especially evident on the lateral areas of the pronotum); by the larger and more abundant granules on the declivity of *D. terebrans*; and (with caution) by their distributions. Within trees, *D. terebrans* can be diagnosed by attack locations (basal portions of trees) and large amounts of resin produced at the attack site. *D. terebrans* and *D. valens* both colonize the same portions of hosts, so where both species occur, it is not possible to definitively identify the beetle based on galleries or host colonization patterns.

Length 5.0–8.0 mm; head generally visible from above; antennal club strongly flattened with three procurved sutures; mature color black; declivity is steeply sloped and rounded, surface shining and granulate; punctures on pronotum coarser than on *D. valens*; hair-like vestiture moderately abundant, longer on declivity.

Dendroctonus terebrans, frons.

Dendroctonus valens LeConte

Biology

The biology and habits of *D. valens* are very closely related to those of *D. terebrans*. Like *D. terebrans*, this species typically attacks large, old, weak, or injured trees as well as freshly cut logs or stumps. Because *D. valens* is considered a secondary pest, mortality and outbreaks are uncommon. *D. valens* can be associated with more aggressive bark beetle species and may hasten mortality of trees attacked by a primary pest, such as *D. frontalis*. Attacks are initiated at ground level by burrowing into the bole and root collar, forming large, reddish-brown pitch tubes. Attack sites and galleries, even on heavily infested trees, are typically found below breast height on the tree bole.

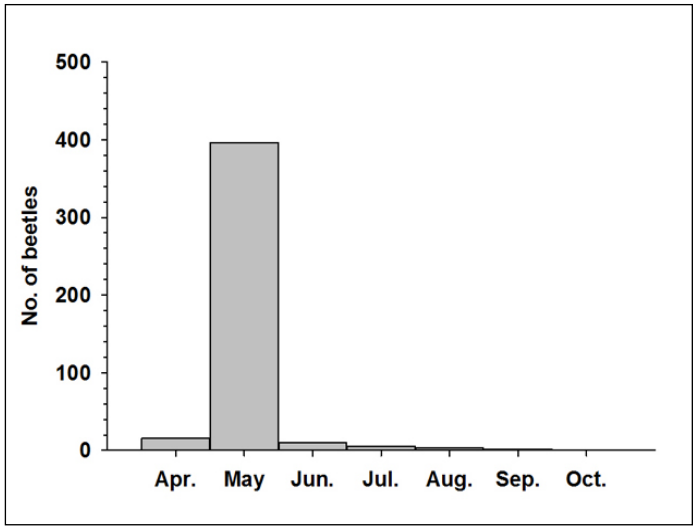
Irregular cave style (left) and vertical linear style (right) egg galleries of *D. valens*.

Northeastern Hosts

Pinus echinata (shortleaf pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus sylvestris* (Scots pine), *Pinus strobus* (eastern white pine), *Pinus virginiana* (Virginia pine), *Larix laricina* (tamarack), *Picea glauca* (white spruce), *Picea abies* (Norway spruce), *Picea rubens* (red spruce)

Gallery

Galleries are quite variable for this species. The entrance tunnel extends upward a short distance after reaching the cambium and may continue upward if excessive pitch is encountered. It may also curve downward toward the roots. The egg gallery can range in shape from linear to branching or even an irregular, broad cave. It is possible to observe all gallery types within a single tree. Eggs are deposited along the gallery in groups of 10 to 40 or more and loosely packed in frass. Larvae mine gregariously, forming a cavity in the phloem in an irregular pattern, but generally away from the egg gallery, filling the large cavity with frass.



Dendroctonus valens, Flight Phenology, Central Massachusetts, 2014.

Identification

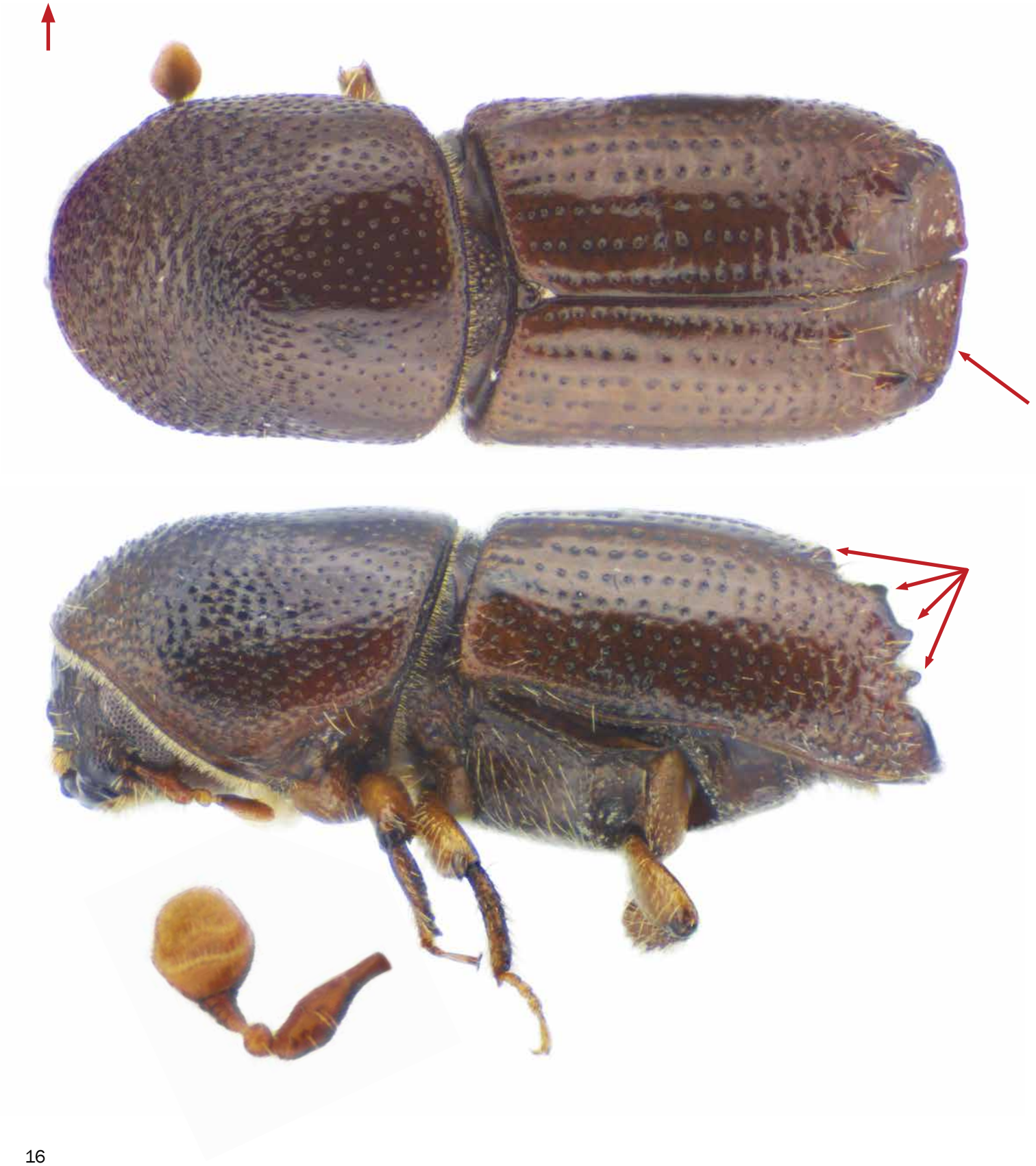
This species is very closely related to *D. terebrans*. They can be separated by the body color of mature adults, by the much smaller punctures on the pronotum (especially evident on the lateral areas of the pronotum), by the smaller and less abundant granules on the declivity, and (with caution) by the distribution.

Length 5.3–9.0 mm; head generally visible from above; antennal club strongly flattened with three outward curving sutures; mature color reddish brown; declivity is steeply sloped and rounded, surface shining and granulate; punctures on pronotum less coarse than on *D. terebrans*; hair-like vestiture moderately abundant, longer on declivity.

Dendroctonus valens, frons.

Ips avulsus (Eichoff)

Small Southern Pine Engraver



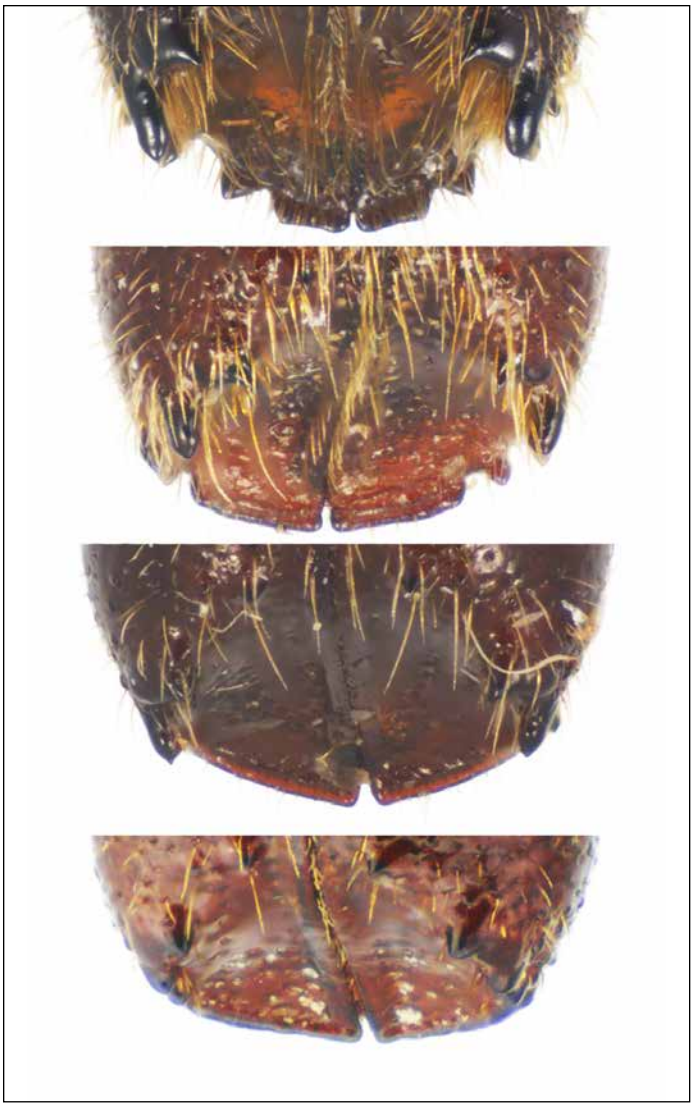
Biology
Like other northeastern *Ips* species, *Ips avulsus* usually attacks fallen, cut, or generally stressed trees and limbs. *I. avulsus* is often associated with trees being attacked by *Dendroctonus* spp., which may hasten tree mortality. It usually prefers the tops and larger limbs of trees.

Northeastern Hosts
Pinus echinata (shortleaf pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus virginiana* (Virginia pine)

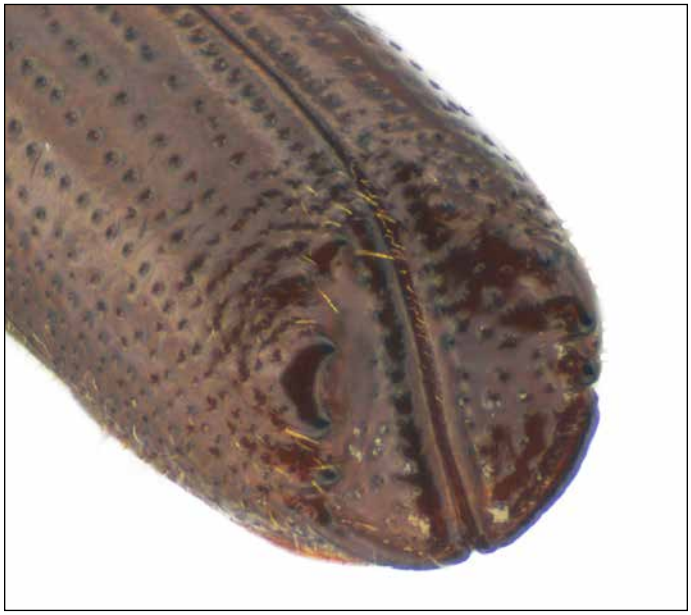
Gallery
Parental galleries are Y-shaped, longitudinal tunnels engraved in the phloem and xylem. Eggs are deposited along this tunnel, and larvae feed laterally. Very similar to *Ips pini* galleries (page 23).

Identification
This species is distinguishable from other northeastern-pine inhabiting members of the genus by its four pairs of spines on the declivity (same as *I. pini*), by its smaller size, and by the wide but short (not projecting as much as *I. pini*) margin at the tip of the elytra. *I. avulsus* is the smallest *Ips* species found in the Northeast.

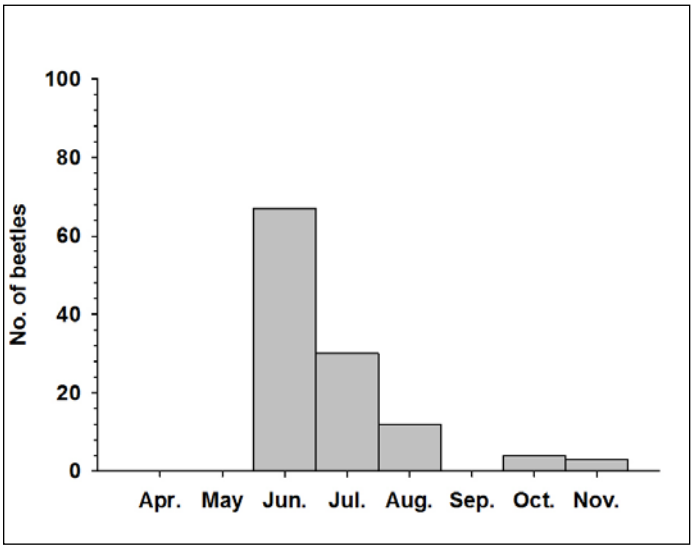
Length 2.1–2.8 mm; head generally not visible from above; mature color dark reddish brown; strongly flattened antennal club with two wavy sutures; vestiture of fine, long, sparse hairs more abundant on sides and declivity; declivity moderately sloping and strongly excavated, bordered with four pairs of relatively small spines; margin at tip of elytra wide and feebly projecting.



Comparison of apical elytral margin of *Ips* spp. (Top to bottom: *I. calligraphus*, *I. grandicollis*, *I. pini*, and *I. avulsus*)



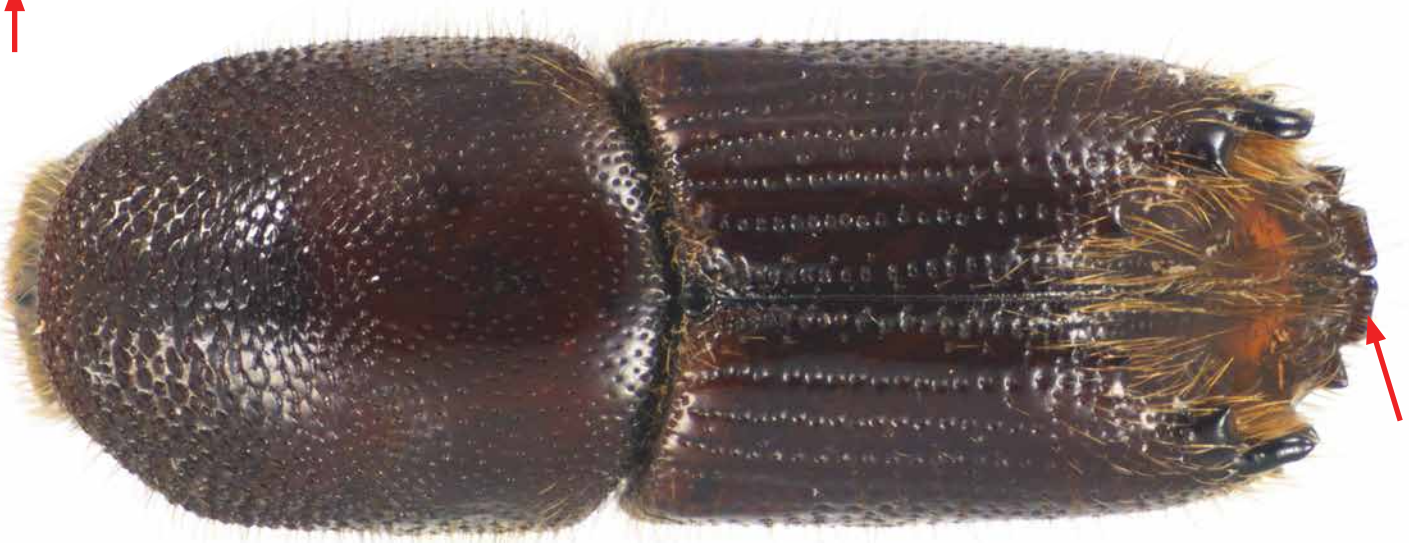
Ips avulsus, elytral declivity.



Ips avulsus, Flight Phenology, Long Island, New York, 2017.

Ips calligraphus (Germar)

Six-Spined Pine Engraver



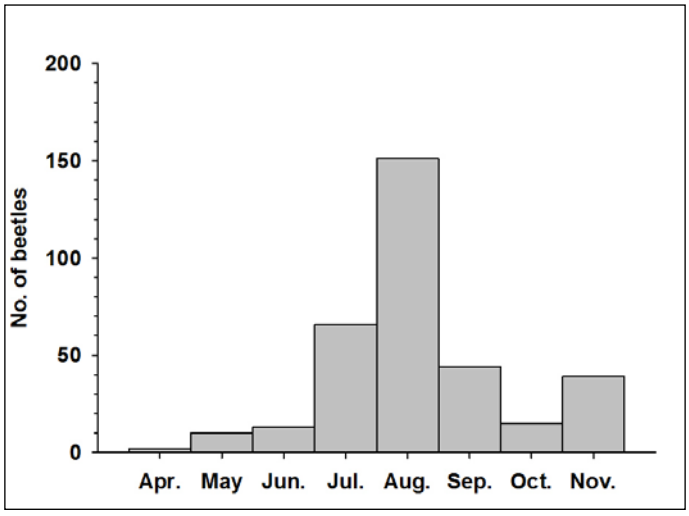
Biology
Like other *Ips* species in the region, *Ips calligraphus* is often found in recently dead trees or downed wood. While rare, *I. calligraphus* can attack living trees and is typically found on lower bole positions. This species generally attacks thick-barked, fallen trees or logs.

Northeastern Hosts
Pinus banksiana (jack pine), *Pinus echinata* (shortleaf pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus sylvestris* (Scots pine), *Pinus virginiana* (Virginia pine)

Gallery
Typically four (but can be from one to five) parental galleries extend longitudinally above and below a central nuptial chamber, forming an X- or H-shaped egg gallery. Larval feeding galleries are moderately long and extend from the parental tunnels, enlarging as they grow.

Identification
This species is distinguishable from other northeastern pine-inhabiting members of the genus by its six pairs of spines on the declivity, by its larger size, and by the narrow margin at the tip of the elytra. *Ips calligraphus* is the largest *Ips* species found in the Northeast.

Length 3.8–5.9 mm; head generally not visible from above; mature color dark reddish brown; strongly flattened antennal club with two wavy sutures; vestiture of fine, long, sparse hairs more abundant on sides and declivity; declivity moderately sloping and strongly excavated, bordered with six pairs of spines; margin at tip of elytra narrow.



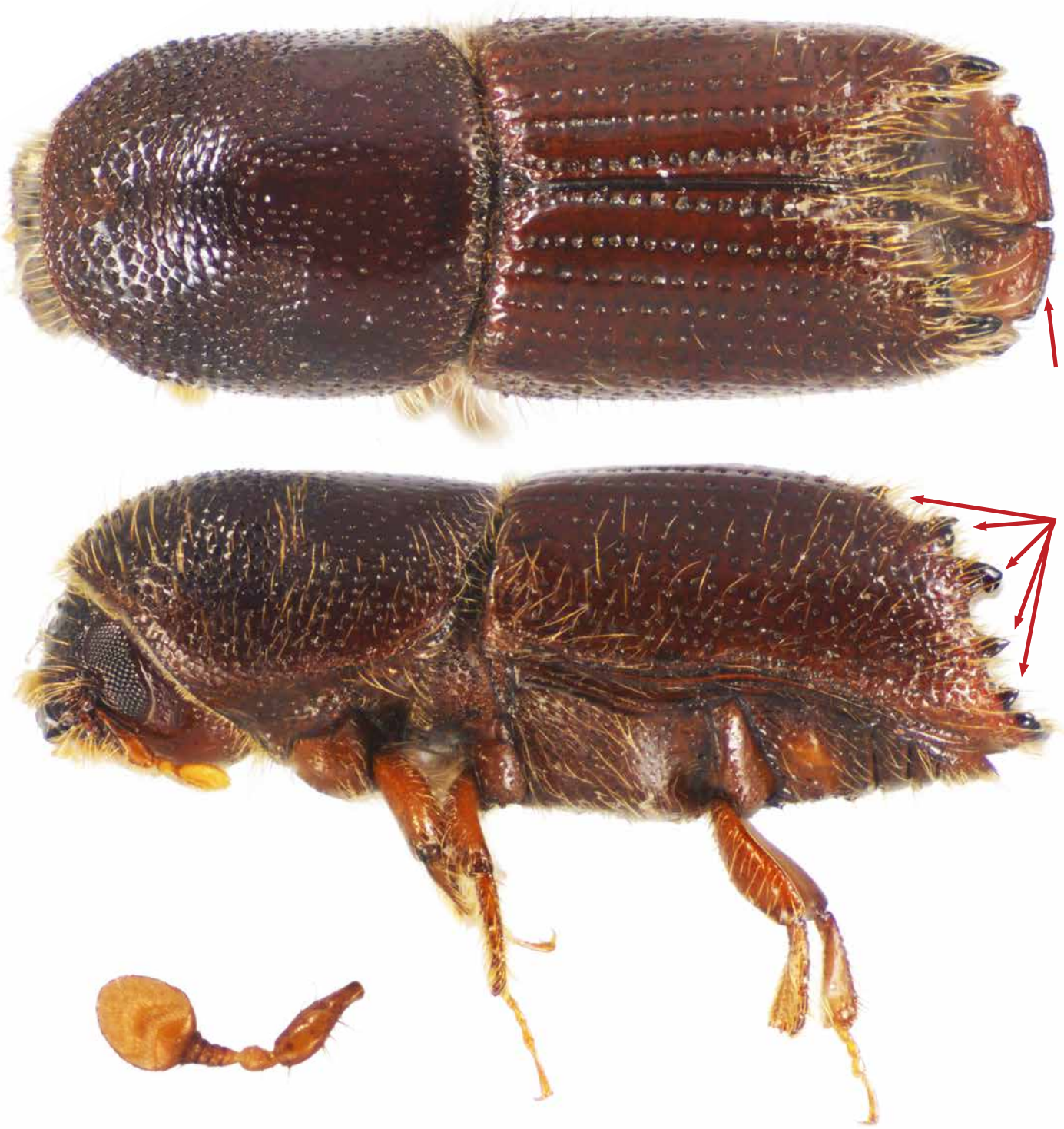
Ips calligraphus, Flight Phenology, Long Island, New York, 2017.

Ips calligraphus, elytral declivity.

X-shaped parental galleries and larval feeding tunnels of *I. calligraphus*.

Ips grandicollis (Eichoff)

Eastern Five-Spined Ips



Biology

Ips grandicollis is generally considered a secondary species that colonizes stressed or recently dead trees as well as other downed wood. On rare occasions in the Northeast, *I. grandicollis* can attack apparently healthy trees. These trees are often drought stressed. This species prefers large limbs and upper tree boles. Male beetles initiate attack and form a brood chamber, where three to five brood galleries initiate and then radiate outward.

Northeastern Hosts

Pinus banksiana (jack pine), *Pinus echinata* (shortleaf pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus sylvestris* (Scots pine), *Pinus virginiana* (Virginia pine)

Gallery

Similar to those of *I. calligraphus*, but with smaller diameter tunnels consistent with the smaller size of the adult beetles. Egg galleries run longitudinally and form a Y or X shape.

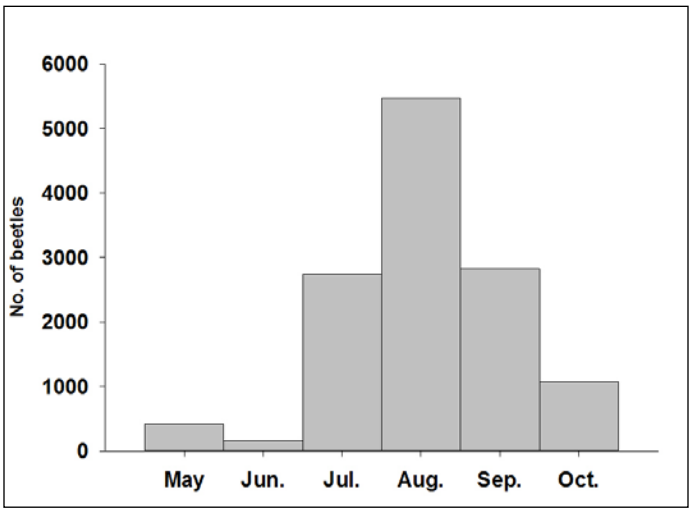
Identification

This species can be separated from other northeastern-pine inhabiting *Ips* by its five pairs of declivital spines and by the width of the margin at the tip of the elytra (narrower than *I. pini* and wider than *I. calligraphus*).

Length 2.9–4.6 mm; head generally not visible from above; mature color dark reddish brown; strongly flattened antennal club with two wavy sutures; vestiture of fine, long, sparse hairs more abundant on sides and declivity; declivity moderately sloping and strongly excavated, bordered with five pairs of spines; margin at tip of elytra moderately narrow.

Ips grandicollis, elytral declivity.

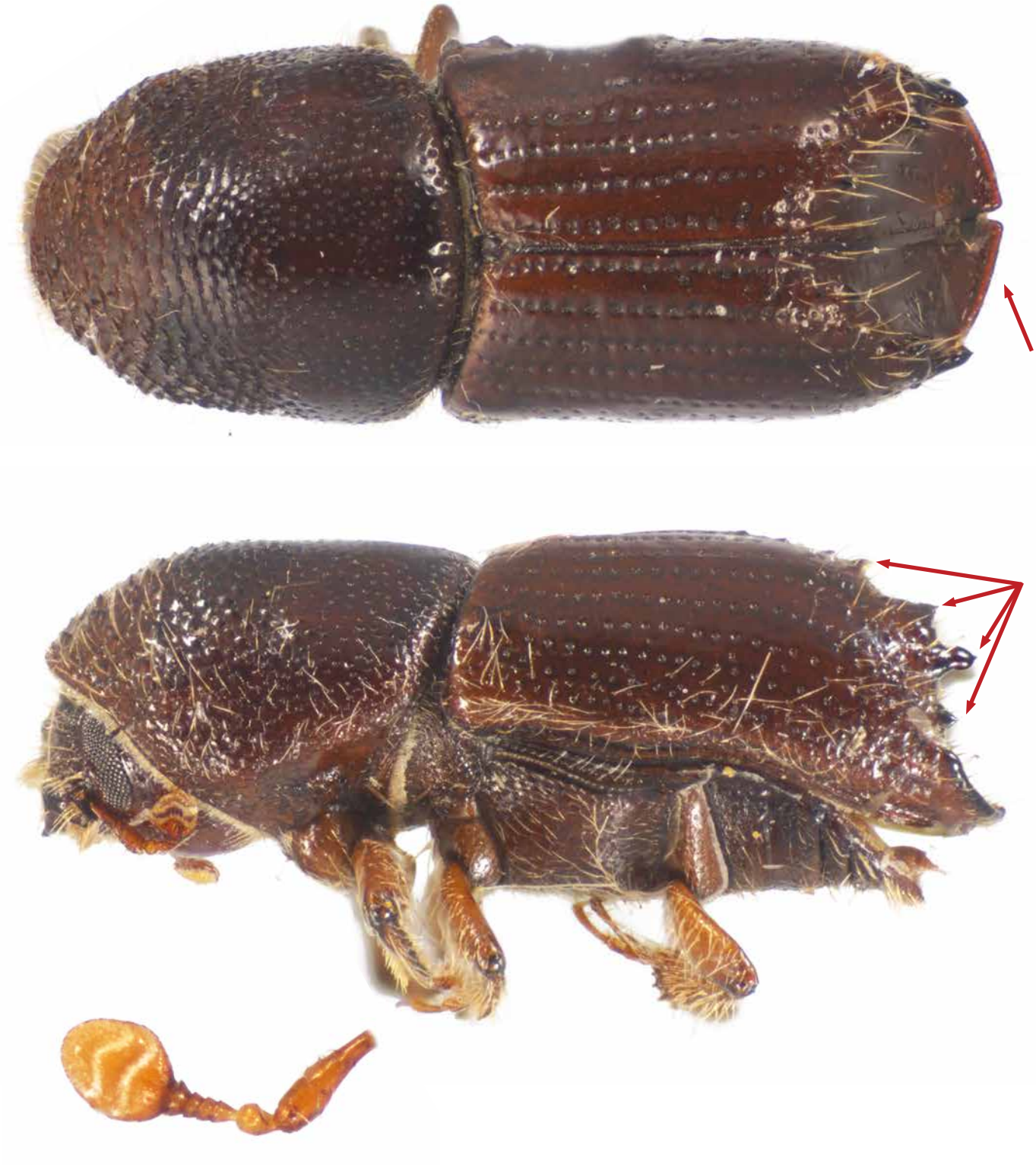
X- and Y-shaped parental galleries of *I. grandicollis*.



Ips grandicollis, Flight Phenology, Central Massachusetts, 2014.

Ips pini (Say)

Pine Engraver Beetle



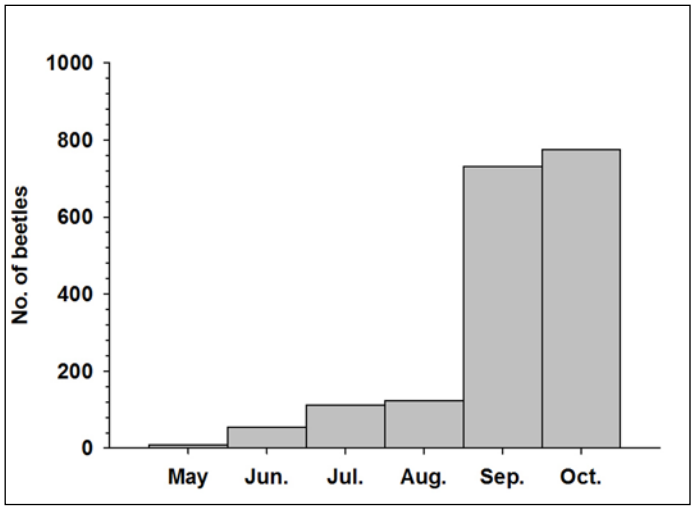
Biology
Similar to other northeastern *Ips* species, *Ips pini* usually attacks fallen, cut, or generally stressed trees and limbs. This species is often associated with trees being attacked by *Dendroctonus* spp., which may hasten tree mortality. It also usually prefers the tops and larger limbs of trees.

Northeastern Hosts
Pinus banksiana (jack pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus sylvestris* (Scots pine), *Pinus virginiana* (Virginia pine), *Picea glauca* (white spruce), *Picea abies* (Norway spruce), *Picea rubens* (red spruce)

Gallery
Parental galleries are Y-shaped, longitudinal tunnels engraved in the phloem and xylem. Eggs are deposited along this tunnel, and larvae feed laterally.

Identification
This species can be separated from other northeastern-pine inhabiting *Ips* by its four pairs of spines on the declivity and by its relatively long margin at the tip of the elytra.

Length 3.3–4.3 mm; head generally not visible from above; mature color dark reddish brown to nearly black; strongly flattened antennal club with two wavy sutures; vestiture of fine, long, sparse hairs; declivity moderately sloping and strongly excavated, bordered by four pairs of spines; margin at tip of elytra long.



Ips pini, Flight Phenology, Southern Maine, 2009.

Ips pini, elytral declivity.

Y-shaped parental galleries and larval tunneling of *I. pini*.

Orthotomicus caelatus (Eichoff)

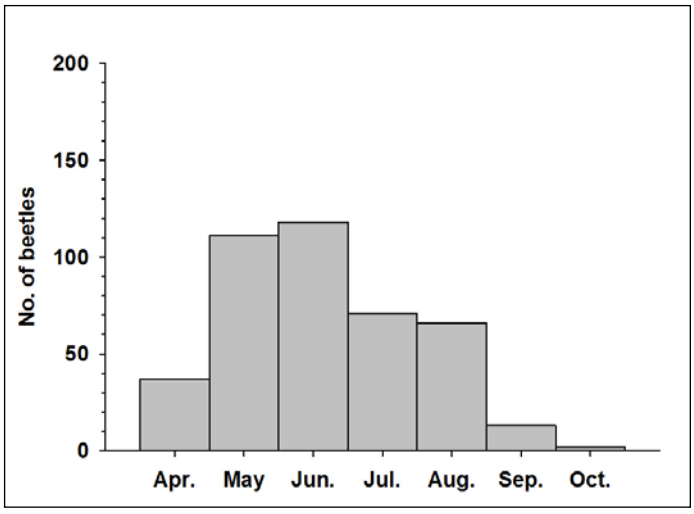
Biology
Adults breed mainly in the bole and branches of recently dead, weakened, or stressed trees as well as stumps of cut trees. Most commonly found in the thick bark of the lower bole. Often accompanies aggressive attacking species (such as SPB) as a secondary associate arriving soon after tree death.

Northeastern Hosts
Any species of *Pinus* (pine), *Picea* (spruce), or *Larix* (larch) within its range.

Gallery
A slightly radial parental gallery is constructed in the cambium with short egg galleries. Larvae mine in the sapwood. Pupation takes place in either chambers in the inner bark or in pits in the sapwood.

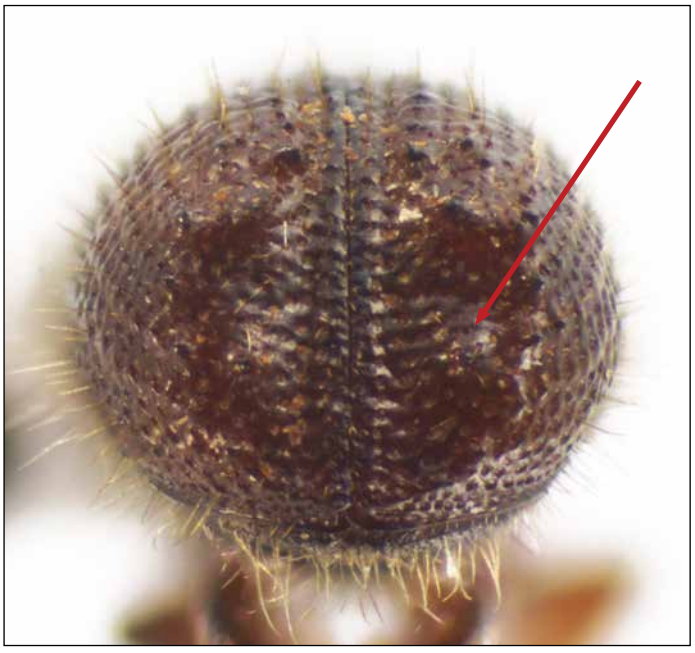
Identification
Somewhat similar to members of the genus *Ips* but can be separated by the more steeply sloped and less excavated declivity with the third spine distinctly inside the border of the excavation, the obliquely truncated antennal club (looks like the tip was sliced off at an angle), and the poorly developed margin at the tip of the elytra.

Length 2.4–3.3 mm; head generally not visible from above; mature color very dark reddish brown; vestiture hair-like, inconspicuous; antennal club obliquely truncate with two inward curving sutures; declivity abrupt and steeply sloped, broadly excavated; three major spines present on declivity, although there are several additional nodules and bumps along the border of the declivital excavation; spine number three distinctly inside the border of the excavation; margin at tip of elytra poorly developed.



Orthotomicus caelatus, Flight Phenology, Central Massachusetts, 2014.

Orthotomicus caelatus, elytral declivity.


Orthotomicus caelatus, elytral declivity, location of third spine.

Hylastes opacus Erichson

Biology
Exotic. Not extensively studied in North America. In Britain, its biology has been described as similar to *Hylastes ater*. Creates egg tunnels in stumps and, more often, in roots of host species. It can become an important pest of replanted conifers after harvests where the beetles feed in the root collar region of weak or poorly planted young trees and can kill vigorous growing plants when populations are high.

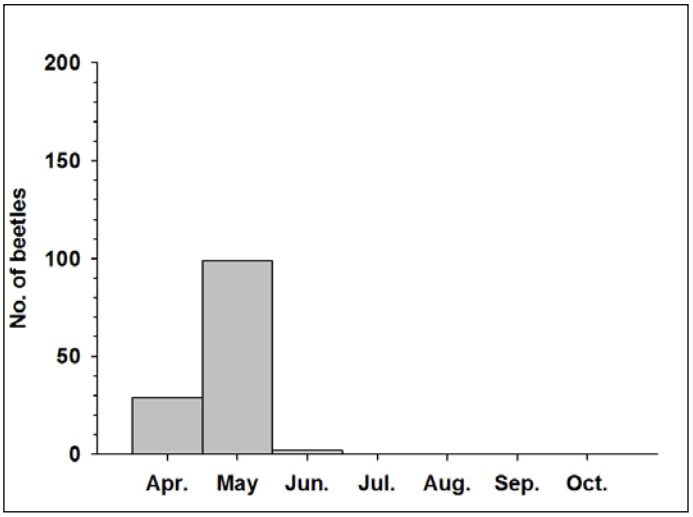
Northeastern Hosts
In Britain, hosts are a variety of species of *Pinus* (pine), *Picea* (spruce), and rarely, *Larix* (larch)

Gallery
Similar to those of *Hylurgops pinifex* but with smaller tunnels corresponding to its smaller size.

Identification
Easily separated from *H. porculus* by the absence of a median ridge on the lower frons and by its smaller size. Distinguished from *H. tenuis* by the shape of the pronotum, which is distinctly constricted in front when viewed from above.

Length 2.5–3.0 mm; elongate; head generally slightly visible from above; mature body color very dark brown to black, with antennae and legs typically reddish brown; antennal club conical with three straight sutures, first segment of club longer than others; pronotum about as long as wide, widest near the middle and distinctly constricted toward the front; declivity evenly convex and steep; vestiture of short, erect, hair-like bristles, somewhat longer and more abundant on declivity.

Hylastes opacus, frons, frontal carina absent.



Hylastes opacus, Flight Phenology, Central Massachusetts, 2014.

Hylastes porculus Erichson

Biology
Breeds in phloem tissues of stumps and roots (occasionally logs) of hosts.

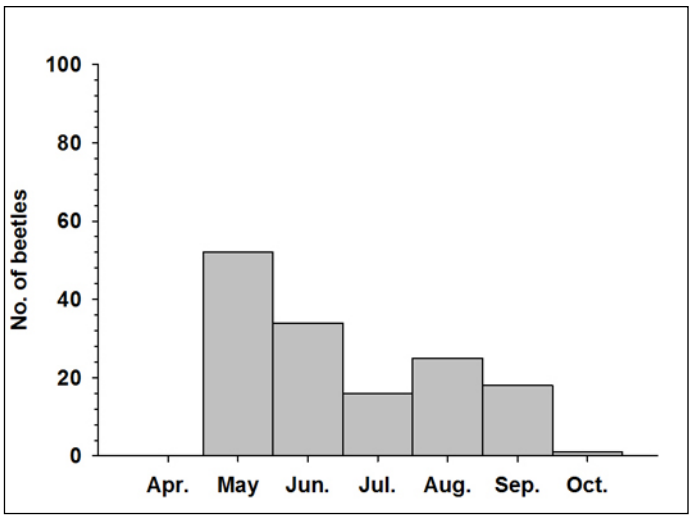
Northeastern Hosts
Pinus banksiana (jack pine), *Pinus echinata* (shortleaf pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus sylvestris* (Scots pine), *Pinus virginiana* (Virginia pine)

Gallery
Simple or branching egg tunnels in phloem tissues, which may slightly engrave the xylem. Eggs are placed in niches and larvae mine phloem tissues aimlessly. Larval tunnels can usually be seen in the phloem when the bark is peeled back. The random larval tunneling eventually renders the gallery patterns indistinguishable.

Identification
This species can be separated from other northeastern-pine inhabiting members of *Hylastes* by its larger size and by the presence of a median longitudinal ridge located on the lower frons midway between the base of the eyes and the mouth.

Length 3.8–5.0 mm; head generally slightly visible from above; mature color black; antennal club conical with three straight sutures, first segment of club longer than others; distinct median longitudinal ridge located midway between the base of the eyes and the mouth; punctures on pronotum somewhat irregular, but generally uniformly large; margins of pronotum gently, outwardly curved when viewed from above; declivity convex, steep; vestiture consisting of sparse, nearly scale-like bristles on declivity.

Hylastes porculus, frons, location of frontal carina.



Hylastes porculus, Flight Phenology, Central Massachusetts, 2014.

Hylastes tenuis Eichoff

Biology
Largely unknown, but likely similar to other members of the genus.

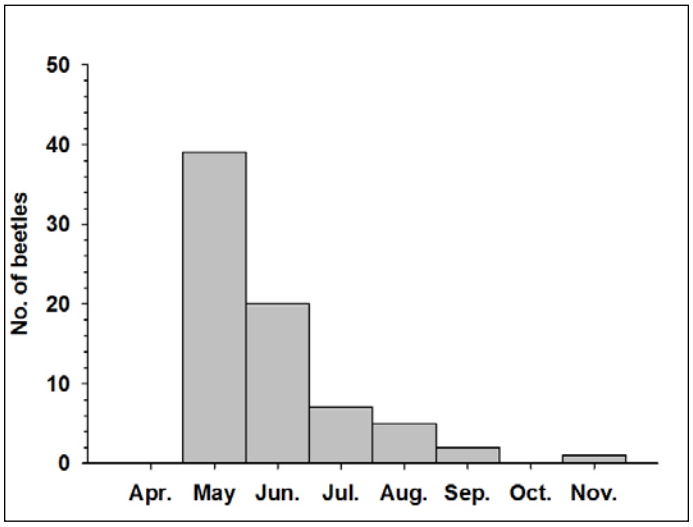
Northeastern Hosts
Pinus echinata (shortleaf pine), *Pinus resinosa* (red pine), *Pinus rigida* (pitch pine), *Pinus strobus* (eastern white pine), *Pinus sylvestris* (Scots pine), *Pinus virginiana* (Virginia pine)

Gallery
Unknown, but likely similar to those of other members of the tribe (*Hylurgops*, *Hylastes*).

Identification
Easily separated from *H. porculus* by the absence of a median ridge on the lower frons and by its smaller size. Distinguished from *H. opacus* by the shape of the pronotum, which is very gently and evenly rounded, sometimes appearing parallel sided when viewed from above.

Length 2.0–2.5 mm; head generally slightly visible from above; mature body color dark brown to nearly black; antennal club conical with three straight sutures, first segment of club longer than others; pronotum slightly elongate, about 1.2 times longer than wide, widest at base and gently, evenly rounded; declivity evenly convex and steep; vestiture of short, erect hair-like bristles, somewhat longer and more abundant on declivity.

Hylastes tenuis, frons, frontal carina absent.



Hylastes tenuis, Flight Phenology, Long Island, New York, 2017.

Hylurgops pinifex (Fitch)

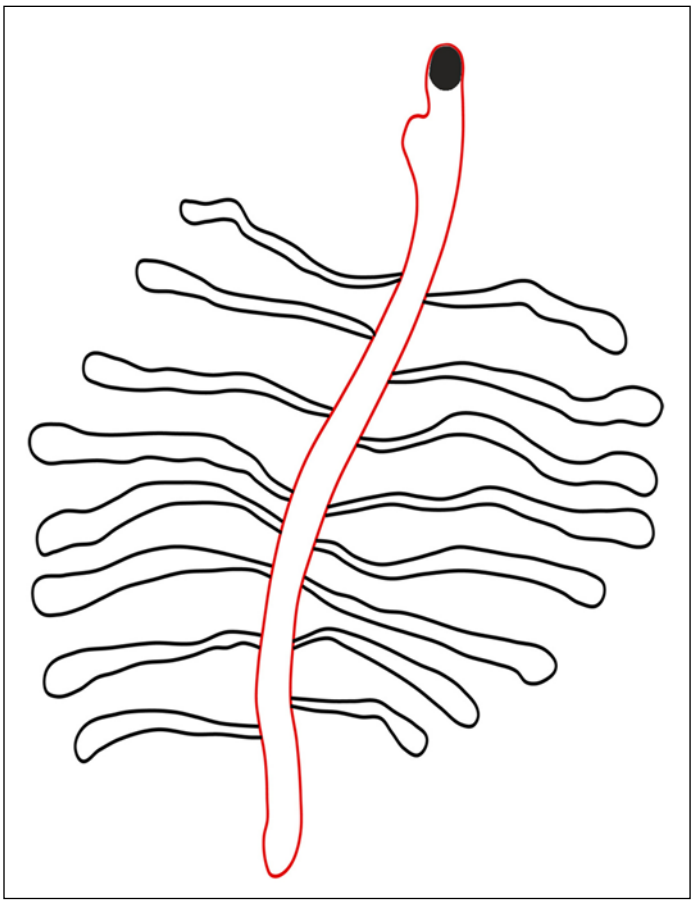
Biology
Overwintering occurs in the late larval and adult stages. Typically constructs tunnels in stumps and roots at or just below ground level and rarely in the bole.

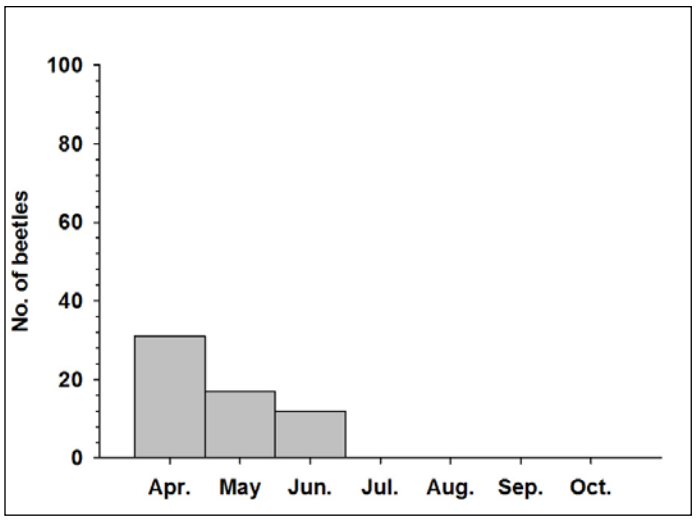
Northeastern Hosts
Pinus banksiana (jack pine), *Pinus resinosa* (red pine), *Pinus strobus* (eastern white pine), *Pinus virginiana* (Virginia pine), *Larix laricina* (tamarack), *Picea glauca* (white spruce)

Gallery
Simple or branching egg tunnels in phloem tissues, which may slightly engrave the xylem. Eggs are placed in niches and larvae mine phloem tissues aimlessly. Larval tunnels can usually be seen in the phloem when the bark is peeled back. The random larval tunneling eventually renders the gallery patterns indistinguishable.

Identification
This genus is very closely related to *Hylastes* and can be distinguished by the presence of equal numbers of large and small punctures on the top of the pronotum. Compared to the similarly sized *Hylastes porculus*, this species is much stouter, with a noticeable constriction in the front portion of the pronotum.

Length 3.7–5.2 mm; stout; head generally visible from above; mature color reddish brown; antennal club conical with three straight sutures, first segment of club longer than others; punctures on pronotum consisting of two distinct sizes, evenly distributed; pronotum strongly constricted toward the front; vestiture of short, oval scales restricted to posterior half of the body and sparse bristles in rows on declivity.


Parental (red) and larval galleries of *H. pinifex*.



Hylurgops pinifex, Flight Phenology, Central Massachusetts, 2014.

Other Species in Northeastern Pines Not Treated in This Guide

Other common species of bark beetles inhabiting northeastern pines that are not treated in this guide. Scale bars represent 0.5 mm. (A) *Ambrosiophilus atratus*, (B) *Crypturgus alutaceus*, (C) *Dryocoetes autographus*, (D) *Dryocoetes affaber*, (E) *Euwallacea validus*, (F) *Gnathotrichus materiarius*, (G) *Pityogenes hopkinsi*, (H) *Pityophthorus confusus*, (I) *Pityophthorus pulicarius*, (J) *Tomicus piniperda*, (K) *Trypodendron lineatum*, (L) *Xyleborinus saxesenii*, (M) *Xyleborus pubescens*, (N) *Xylosandrus germanus*.

Glossary of Technical Terms

Abdomen—the third or posterior, major division of the insect body, consisting primitively of 11 segments, but normally with 9 or 10 apparent segments and bearing no functional legs in the adult stage

Antennal club—the more or less enlarged distal articles of a clubbed antenna

Anterior—in front; before

Apex—end of any structure distal to the base

Bisinuate—with two sinuations

Brood—all the individuals that hatch at about the same time from eggs laid by one series of parents and that normally mature at about the same time

Callow—condition of the adult shortly after transforming from pupa to adult when its cuticle is not fully hardened or fully mature in color

Cambium—in the stems and roots of vascular plants, a layer of cells lying between the xylem and phloem

Carina—an elevated ridge or keel, not necessarily high or acute

Clypeus—that part of the insect head below the frons, to which the labrum is attached anteriorly

Coxa—the basal segment of the leg, by means of which it is articulated to the body

Declivity—downward sloping portion of a particular structure (for example, elytral declivity is the apical downward sloping portion of the elytra)

Denticle—a small tooth

Distal—near or toward the free end of any appendage; that part of a segment farthest from the body

Dorsal—on or of the functionally upper surface

Elytra—the leathery forewing of beetles (Coleoptera) that serves as a covering for the hind wings, commonly meeting opposite elytron in a straight line down the middle of the dorsum in repose (singular = elytron)

Epicranium—the upper part of the head from the frons to the neck that includes frons, vertex, and genae

Epistoma—the oral margin or sclerite directly behind the labrum

Frass—solid larval insect excrement; plant fragments made by wood-boring insects, usually mixed with excrement

Frons—the upper anterior portion of the head capsule, usually a distinct sclerite between the epicranium and clypeus

Funicle—that part of the antenna comprising all the segments between the scape and the club

Gallery—mine, tunnel, or burrow visible beneath the epidermis of plant tissue, made by a larva

Genae—cheeks; the part of the cranium on each side below the eye

Granule—a small grain or a minute grain-like elevation

Instar—stage between molts in the nymph or larva, numbered to designate the various stages (for example, the first instar is the stage between the egg and first molt)

Integument—the outer layer of the exoskeleton of an insect

Labrum—the upper lip, abutting the clypeus in front of the mouth

Lateral—relating, pertaining, or attached to the side

Margin—the part of a surface along the edge

Mesal—pertaining to, situated on, or in the midline of the body

Obliquely truncate—cut off slantingly (any direction between perpendicular and horizontal) at the tip

Occiput—the posterior part the epicranium between the vertex and the neck

Phloem—plant tissue made of various cell types that transports dissolved organic and inorganic materials over long distances within vascular plants; distinguished from xylem by the general absence of thickened cells and by the presence of cells containing areas resembling a sieve

(continued on next page)

Glossary of Technical Terms (continued)

Pitch tube—conical or globular eruptions of pitch from the bark of a tree; created by the tree as a defensive response to attacking beetles in an effort to eject the beetle from its bore hole

Posterior—hinder or hindmost, opposed to anterior

Procurved—curved forward

Pronotum—the upper and dorsal part of the prothorax

Prothorax—the middle segment of an insect body, between the head and the abdomen

Punctation—pits or depressions of variable size in the cuticle

Recurved—curved backward

Scape—the first or basal segment of the antenna

Sclerite—any plate of the body wall bounded by membrane or sutures

Setae—hair like projections of the cuticle

Sinuate—cut into sinuses; wavy, often applying specifically to edges and margins

Spine—a more or less thorn-like process or outgrowth of the cuticle not separated from it by a joint

Suture—groove marking the line of fusion of two formerly distinct plates

Thorax—middle portion of the body between the head and abdomen, consisting of three segments (prothorax, mesothorax, and metathorax), each of which usually bears a pair of articulated legs

Tubercle—a small, knob-like or rounded protuberance

Ventral—pertaining to the under surface of a structure or body

Vertex—the top of the head between the eyes, frons, and occiput

Vestiture—the general surface covering comprised of cuticular projections (for example, setae, scales)

Xylem—plant tissue consisting of various cell types that transports water and dissolved substances to the leaves, possessing vertical systems of dead cells with thick, lignified walls; the wood of trees and shrubs

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Cover photo: The underside of bark peeled from a pine tree killed by the southern pine beetle (*Dendroctonus frontalis*), showing the typical serpentine feeding galleries. (Courtesy photo by W.H. Bennett, USDA Forest Service, Bugwood.org)

Page 3: *Dendroctonus frontalis*-infested pine tree. (Erich G. Vallery, USDA Forest Service - SRS-4552, Bugwood.org)

Page 13: Winding, S-shaped parental galleries of *Dendroctonus frontalis*. (Ronald F. Billings, Texas A&M Forest Service, Bugwood.org)

Page 15: Egg galleries and gregarious larval feeding area of *D. terebrans*. (Ronald F. Billings, Texas A&M Forest Service, Bugwood.org)

Page 17: Irregular cave style (left) and vertical linear style (right) egg galleries of *D. valens*. (Left to right: Ladd Livingston, Idaho Department of Lands, Bugwood.org; Kenneth E. Gibson, USDA Forest Service, Bugwood.org)

Page 21: X-shaped parental galleries and larval feeding tunnels of *I. calligraphus*. (Ronald F. Billings, Texas A&M Forest Service, Bugwood.org)

Page 23: X- and Y-shaped parental galleries of *I. grandicollis*. (Jeffrey Eickwort, FL Department of Agriculture and Consumer Services, Bugwood.org)

Page 25: Y-shaped parental galleries and larval tunneling of *I. pini*. (David McComb, USDA Forest Service, Bugwood.org)

Page 35: Parental (red) and larval galleries of *H. pinifex*. (From Mercado-Vélez, J.; Negrón, J.F. 2014. Revision of the new world species of *Hylurgops* LeConte, 1876 with the description of a new genus in the *Hylastini* (Coleoptera: Scolytinae) and comments on some Palearctic species. Zootaxa. 3785(3): 301–342.)

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